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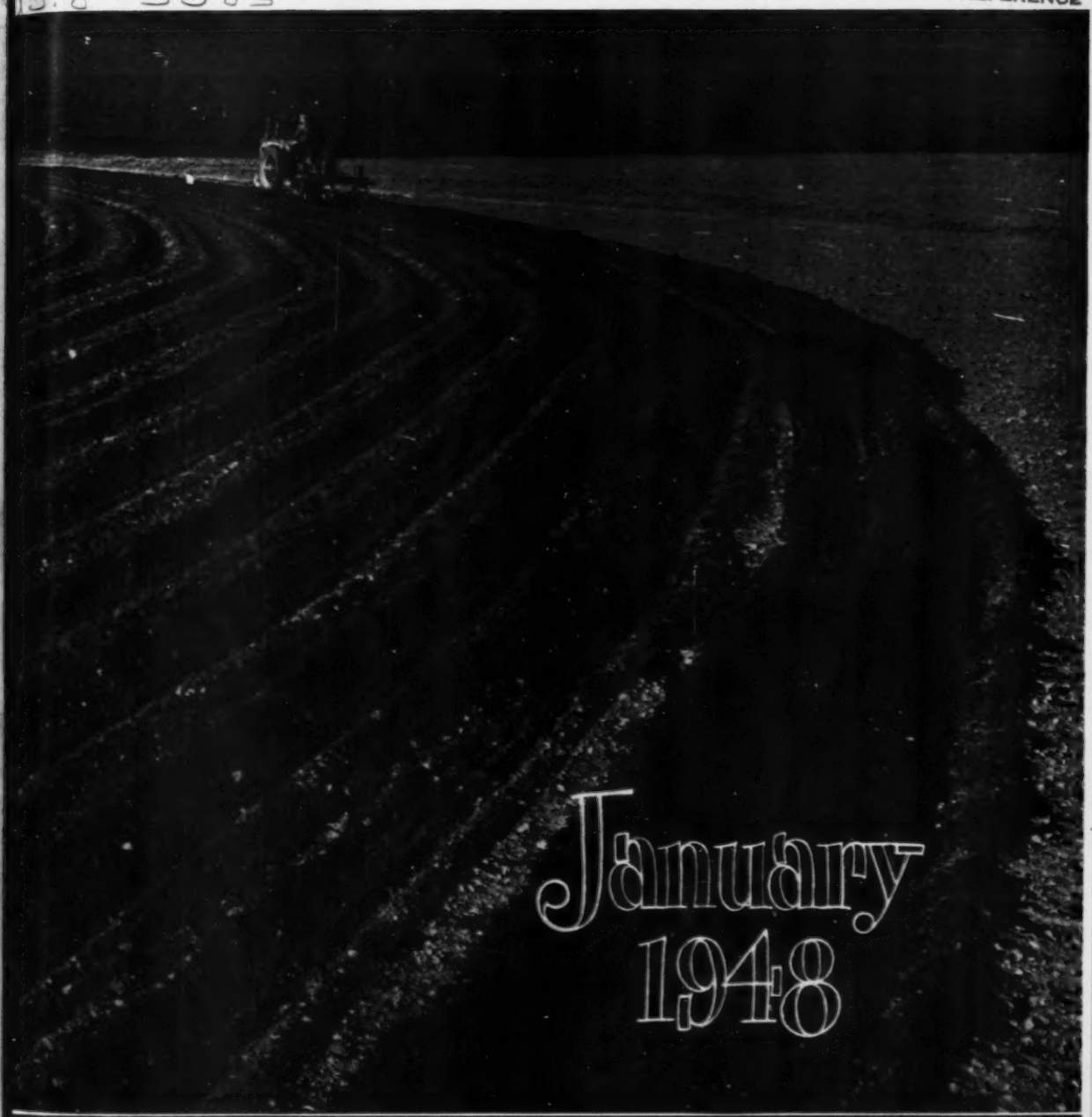

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SECRETARY OF AGRICULTURE

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CHIEF, SOIL CONSERVATION SERVICE

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WELLINGTON BRINK
Editor
Art Work by
W. HOWARD MARTIN

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, with approval of the Director of the Budget. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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CONSERVATION REPORT FROM KENTUCKY.—"Tobacco yields have increased from 800 pounds per acre to 1,700 pounds per acre in a normal year," writes S. A. White, Adairsville, Ky. "Corn has increased from 20 bushels per acre to 50–60. . . . Hay and pasture yields are consistently high.

"The thing that makes me take pleasure is the fact that we are just in the beginning of our program and can see heartening results. Much more can be accomplished."

THE SOIL COMES FIRST.—"The old farm through soil conservation practices is coming back," writes Howard Gray, Clarkesville, Ark. "We are going to make a living on the farm. Junior is going to have a home and will not have to work in a filling station. In 1945 a tornado hit my farm. It wrecked my home, destroyed the outbuildings and a portion of the orchard. Then, this last fall I was in the middle of a half-mile wide hailstorm that broke out the window lights and ruined the roof of my house. It did damage to the orchard trees, stripped the seed from the lespedeza seed patch—everything hits me—but by all that's good and bad we are saving the soil. If we have soil we can build back the buildings and grow new orchards."

SWELL IDEA.—For the price of one dollar each, some of our readers are giving subscriptions to Soil Conservation Magazine as Christmas presents. A monthly reminder of good fellowship.

FRONT COVER.—Those who love the beauty of the sea should also appreciate the rounded waves of fresh-turned dirt on these corn lands of Nebraska.

Planting is being done on a diversion terrace; slope, approximately 12 percent. Conservation farming paints a new landscape on hundreds of thousands of midwestern acres. Photo by B. C. McLean.

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By WELLINGTON BRINK
EDITOR

Water Put to Work

WATER is the No. 1 problem on many a farm. Millions of fertile acres do not produce today because they are too wet or too dry or—alternately—both. But modern techniques of water conservation and management have shown us what to do.

The new science came to 3 million acres in South Carolina. There, where production had never been safe, the land responded with a bang.

The new techniques include a lot of ingenious devices you probably never heard of in all your born days. They are used separately, or in combination, to suit the situation. They have become the very crux of most of the farm plans now being written in the Charleston and the Georgetown-Williamsburg Soil Conservation Districts. And they are getting a terrific workout down there in the Low Country.

A few weeks ago I visited this area at the urging of Hugh Bennett. The Chief of the Soil Conservation Service makes it his business to conserve farm water along with farm soil. Thanks to the tip, I saw a convincing demonstration of how water can be controlled and put to work.

The Low Country has to cope with irregular weather, and with fields that are close to sea level. Three months of rain alternate with long stretches of clear skies. Water management's task is to rush "excess" water off the land and later, in many instances, to redistribute it, an inch or a fraction of an inch at a time during dry spells.

On some farms the technicians virtually put the water table on a hoist, raising or lowering it almost at will. On others, they provide a gridwork of drainage ditches and a battery of pumps which

Automatic wooden tidal gate in freshwater spilling basin. Of cypress construction, gates like this were used 150 to 200 years ago on the old rice plantations, in connection with gravity and flood irrigation. Thus far, they have not been bettered.

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speed heavy downpours off the fields and into the sea. Here and there they locate tidal gates to let sweet water off and keep salt water out. Large main canals are used not only for drainage but also for storage. Now and then, dikes are erected along the coast as defenses against tide and storm. There are elaborate systems of reservoirs and of surface, subway and overhead irrigation. There are tile drains, deep and shallow wells, open ditches.

Clearing the land is no small undertaking in itself. It's done on a grand scale. Sizeable trees topple under the grim fury of bulldozer, and smoke from burning brushpiles can be seen many miles away.

The districts bring in Soil Conservation Service technicians to analyze, plan and follow through. The districts also see that contracts are drawn properly, that needed equipment is made available, and that maintenance is provided.

Let's visit a few plantations, with Remo Molinolari as our guide. "Moli" is a crack engineer, as expert in human relations as in hydraulics. He's district conservationist.

First stop is Scottswood plantation, which a few months ago was a great shallow lake due to lack of outlets. It is typical of the 70,000-acre "frog hollow" section of Lanes Community, Williamsburg County.

Two Junes ago Scottswood's 5,000 turkeys were pounded by rains that had them roosting in trees or clawing for foothold on a few exposed knolls. All but 50 of the farm's 7,000 acres were waterlogged, and they stayed that way until the district moved in with SCS technicians. The technicians were rubber-booted, courageous, and imaginative.

Almost unbelievable are the feats of the bulldozer. This toppling pine characterizes the high-powered clearing being done in the Low Country as a prerequisite to drainage, irrigation and land-preparation. This bit of action was on the farm of T. W. Thornhill, in the Charleston County Soil Conservation District.

The author's camera, late in the afternoon of the visit to Estherville, captured this swamp fairyland through a dining-room window. The moss-hung liveoaks and the big-footed cypress border a long, meandering and ancient lake from which has come many a record bass.

They waded knee-deep, even hip-deep, to make surveys and run accurate drainage lines. Then they called, for draglines, gouged out 50,000 cubic yards of main canal, laterals, and ditches, and kicked the extra water into Ox Swamp. It cost not more than $14 per acre to set the farm free. Oliver Iselin, owner, was so happy that he celebrated by putting on carpet slippers and walking across his entire place to show everyone that it was dry!

Drainage merely set the stage. It made possible the development of a complete farm plan. For generations Scottswood had been the largely unchallenged domain of fox, rabbit, and hoot owl. Now those rich, mellow, sandy loams—capable of growing almost anything—were ready for work. Attention shifted to such matters as fire lanes, brush-clearing, selective cutting of trees, rotations, liming, and fertilizing. Fields of truly virgin soil could now be plowed and put in shape. Scottswood's improvements are now bringing bumper crops of corn, cotton, Sudan grass, tobacco, fowl, butterfat, and red meat. Still better, the gains can be held and the improvements made permanent. It all started with the new wrinkles in water management.

Scientific planning is fundamental. Bad ditching can hold back a farm. But good ditching can spur it along to full and continued production. Nowhere else is this better illustrated than on the adjoining farms of M. L. Few, J. E. Pettigrew, Jr., and D. C. Brown, which lie 10 miles out of Kingstree.

On Few's farm I saw one of the old ditches, a

Drumsticks and whitemeat on the hoof. These turkeys are making weight on small grain and annual lespedeza; Scottswood.

small crease with an effective depth of only 18 inches. Close to it is one of the new man-sized ditches 6 to 7 feet deep. Comprehensive planning enabled Few to continue with both cattle and row crops without sacrifice of either. In the 5 years he had owned the place there were times when it was almost entirely flooded. Properly drained, however, the old acres on higher ground are safe, and they have been joined in safety and productiveness by 300 additional acres. Tobacco wilt has almost disappeared. Winter grazing has cut down the feed bill. The black Angus herd has increased from 40 to 75. Sale of timber to pulp mills has almost paid for clearing. *Crotalaria spectabalis*—resistant to nematodes—has earned itself a niche in the tobacco-soil-building scheme.

Water technicians attach importance to the factor of convenience. Few benefits from this. On his farm there are 20,000 linear feet of farm ditches and 5,000 feet of main canals. One of the latter is graded east, the other west, with a bit of low plateau between. The lay-out is arranged in square blocks of 15 to 20 acres each, not too small and not too large. Fencing is facilitated. Few can plant or cultivate all day long with little interruption or delay. Farm roads and bridges are adjusted to the requirements of drainage, machinery, and farm operations.

Few's drainage system extends right across the farms of Pettigrew and Brown. You can do that kind of thing in the districts.

Most phenomenal of all is the water handling on Greenfield plantations, not far from George-

Portable sprinkling on the Osgard Hamlin farm. It makes possible two or three additional pickings of cucumbers.

Among the Low Country's brilliant feats in water conservation and management is the excavation of great reservoirs for storage and irrigation. This one is near Mount Pleasant, S. C.

Remo Molinolari takes a look at the young corn growing on soil (seashells and all) pumped from Winyah Bay 2 years previously; Estherville plantation.

This is virgin land on the Scottswood Plantation, now drained and going under the plow for the first time.

town. Dependable water and dangerous water are harnessed to the same wagon. On this farm an inch or two of moisture either way can make or break a crop. Greenfield's land is rich but it is also nervous and temperamental. And the seasons are tricky.

Three hundred acres have been cleared of trees and brush, drained, and put to work making corn, small grains, and hay for a herd of Herefords. Fertilizer is needed generally. Some fields, especially those that have been under water a long time, require heavy liming and fertilization: 2 tons of lime, 100 pounds muriate of potash, 600 pounds of 16 percent superphosphate, at the outset, and substantial booster injections every third year thereafter. Water control comes high at times, but it pays off in high-income, specialized crops.

Dark, loamy soils heavy in organic content cloak the fields to a depth of 10 inches. Under them is a layer of clay. Lower still is a deposit of sand of unknown depth. In this sand Nature supplies a "tile" drainage system of her own, so extensive and so effective that in dry periods it virtually bleeds the land to death. Trying to grow crops was highly hazardous until the district and SCS technicians essayed some bold experimentation. They undertook to test the theory that the sand could be used for two-way traffic, that it could direct moisture back to the crop when desired, and that the water table could be adjusted somewhat arbitrarily by skilled engineering.

To control the water level entailed the installation of 2 miles of main canals and 5 miles of laterals and farm ditches. Close to 40,000 cubic yards of dirt was moved—many a big bite by the draglines. The main canals averaged 5½ feet deep; 4 to 5 feet wide at the bottom; side slopes, 2:1; spoil banks lashed down by kudzu. Maximum depth of farm ditches is 30 inches, which permits machinery to cross.

The canals, equipped with gates, catch the torrential rains and dump part of the excess water into the Black River. But they do not dump all of it. They bank a portion as reserve capital, impounding it against the frequent dry spells of April, May, June, October, November, and December. The captured water, backed up through the sands and held slightly above their surface, is kept in reach of the roots of thirsty plants. The canals serve the multiple purpose of drainage, storage, and spoon-feeding.

But for downright complications, Moli nominates the Copohee farm, near Mount Pleasant. T. W. Thornhill and Osgood Hamlin, operators,

Hamlin connects irrigating pipe used for watering 13 acres of cucumbers.

work within extremely narrow limits. One-half to three-quarters inch of moisture at precisely the right time makes the difference between complete crop failure and a recent average gross of $1,000 per acre from beans, cucumbers, and squash. The water system paid for itself in one season.

Three miles of kudzu-covered dikes protect two adjoining farms against the Atlantic's spring tides. Before these 7½-foot barriers were thrown up the land for 1,200 feet back of them could not safely be cultivated.

Included in the system are two reservoirs of a million-gallons capacity each, for irrigation. The reservoirs are tied up to the drainage lay-out to catch the surface run-off. The overflow goes down diversion ditches to the sea.

Back over the fields from the reservoirs extends an overhead sprinkler system. It is set up not more than about twice a year. Two-inch and four-inch portable pipes, hooked up to portable pumps, return to the soil just enough of the once-rejected run-off to supply the growing plants the sip or two they need, at precisely the moment they need it most.

Rounding out Copohee's facilities are combination drainage-storage canals and metal tidal gates—devices now becoming typical. Without them, the shallow-rooted truck crops would have a tough time of it.

Thornhill and Hamlin arrived at this water wizardry after extensive consideration of all the simpler methods. Moli tells me that the reservoirs got the nod after the experts had given up on wells. Shallow wells were not too salty but fell short of adequate capacity. Deep wells were known to have capacity but too much salt. At Copohee water of more than 500 parts of salt per million is regarded as undesirable for irrigation.

The Low Country does not follow a tight formula. This is perhaps the point of greatest significance. Each system is custom-built. Land types, tides, water tables, soil permeability, farmer preferences, and innumerable other factors dictate how water shall be managed.

Miracles are being accomplished on Yonges Island with gravity irrigation and portable sprinkling.

Reservoirs and shallow wells give life and vigor to the farm of C. C. Garraty, a cooperator with the Charleston County Soil Conservation District. Gate-closed depressions fingering up from the sea are also utilized to advantage here.

Genius is at work for C. E. Gibson, a district supervisor located near Meggett. On this farm a tidal basin and automatic gates hold a lake of sweet water just long enough for the highest tides to rise and recede without salt-poisoning being incurred.

There's further sleight of hand at Estherville, over on Winyah Bay, where entire fields, too low to drain, have been built up and put into production by dredging from the inland waterway.

The evidence is in. Most of the challenge of the Low Country is yet to be met. But enough already is on record to clinch the case for water conservation and management. It takes imagination, it takes farmer cooperation, it takes science—but water problems *can* be solved and an important new agricultural frontier developed.

SOUND INVESTMENT.—The Security Savings Bank in Marshalltown, Iowa, has purchased 100 yearly subscriptions to the SOIL CONSERVATION Magazine. These copies are to be sent out by the bank to cooperators with the district and to some of the rural schools in the county.

Draglines are busy in the Low Country. Here is being opened up an outlet for a new drainage system.

DISTRICT PROFILE

KENT LEAVITT

Top Man

Kent Leavitt.

By ROBERT B. THORNTON

After 3 years in banking and 5 years in the Consular Service, Kent Leavitt decided that more than anything else in the world he wanted to be a farmer.

Far-away posts were all right, but the satisfaction of owning and working a piece of land, the pleasant memories of boyhood days on a farm, never failed to overshadow the often exciting but sometimes drab life of a diplomat.

And so, since 1935, Kent Leavitt has been a farmer. Fraleigh Hill farm sprawls over 400 acres in the uplands of Dutchess County, N. Y., not so far from the town of Millbrook.

Leavitt is not only building up Fraleigh Hill into an outstanding farm, but has developed a two fold farm retail business—milk and cheese. On the side, he has taken far more than one man's share in community activities. For the past 2 years he has been president of the Boy Scouts and of the Community Chest of Dutchess County. He is chairman of the board of directors of the Dutchess County Soil Conservation District. He helped organize, and is president of, the New York Association of Soil Conservation Districts. He is a member of the New York State Soil Conservation Committee by appointment of Governor Dewey. **And just recently he was unanimously elected president of the National Association of Soil Conservation Districts.**

Kent Leavitt's fast pace keeps Fraleigh Hill on the move from 5 in the morning until midnight. He's putting a finishing touch on a field of corn that will provide prime silage this winter for his championship herd of Brown Swiss.

Kent Leavitt is not the sort of person who merely lends his name to a worthy cause. When he accepts an office it's because he believes in the job to be done, and wants it done right. He's the busiest and most energetic man I know. He never seems to tire, although he's usually up by 5 or 5:30 and rarely gets to bed until after midnight.

Leavitt is "built" for a fast pace. He's tall—a bit over 6 feet—and put together like a college end. Whatever the job, he works top speed—on the farm, in his farm office, at the soil conservation district office, anywhere. In meetings he's brusk and businesslike, but never tactless. One of his favorite stunts is to get you out of bed at 5:30 to have breakfast with him. He doesn't believe in wasting time. If he winds up some work, or comes home from a meeting or trip and half an hour remains before supper, he's more likely to wheel out a piece of farm equipment and a tractor and head for the nearest field that needs attention than he is to sit down and relax with the evening paper.

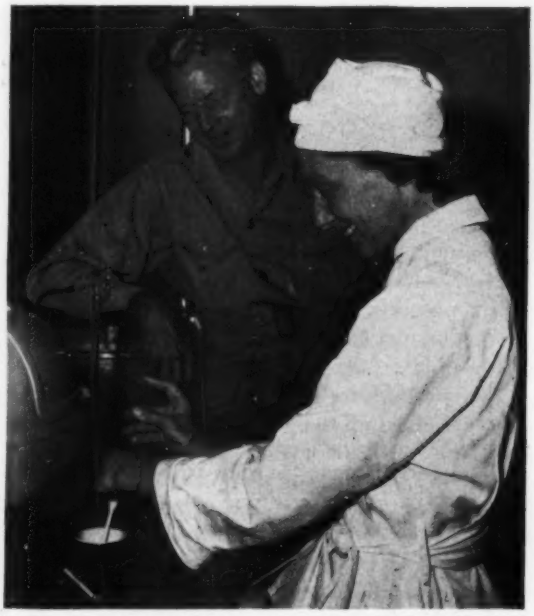
NOTE.—The author is district conservationist, Soil Conservation Service, Millbrook, N. Y.

When Leavitt first began operations at Fraleigh Hill he saw the advantage of selling direct to the consumer. A retail business for farms in his section of the country is one of his pet ideas. And so he set up a pasteurizing and bottling plant, and bought a retail milk route. Today, the milk-processing plant averages 2,500 quarts a day. Production on the home farm is a minimum of six cans, from a herd of registered Brown Swiss; the balance is purchased from other farms.

There was the problem of what to do with surplus milk during flush seasons. It gave rise to the Fraleigh Hill Farm cheese business, with Mrs. Leavitt playing the leading role.

Molly Leavitt had taken the Penn State short course, "Market Milk," which included brief instruction in cheese-making. To help on the surplus milk problem, she started experiments designed to produce a soft cheese. With the aid of J. C. Marquardt, of the New York State Division of Milk Control, and Professor Dahl of Penn State, Molly Leavitt developed a uniformly high quality cheese of the Brie type, which she called "Poona."

Today, more than 1,000 pounds of the cheese is sold each month at premium prices (about 20 to 25 percent more per pound than most similar cheeses). The business, which was started in an effort to solve a seasonal surplus milk problem, is only 2 years old.



Under Leavitt's admiring eyes, his wife Molly tests samples from a thousand-pound vat of certified milk that will soon become a new batch of "Poona" cheese. "Mrs. Leavitt and I are a team," says Leavitt.

Fraleigh Hill farm, naturally, has a complete farm conservation plan worked out in cooperation with the Dutchess County Soil Conservation District with the aid of Soil Conservation Service technicians. Highlights are contour strip cropping with rotation, drainage, clearing of land suitable for cultivation, pasture management, construction of a farm pond and diversion terraces, selective cutting of timber, fencing and reforestation.

Fraleigh Hill farm boasts two young Leavitts—Charles, now in his first year of agriculture at Cornell, and Adele, the younger. There is also a Great Dane who scares the britches off you till you find out how amiable he is. There are assorted small dogs, and horses. And there's a house that's built to "live in".

Perhaps the best way to indicate how Kent Leavitt feels about soil conservation is to quote the statement he gave to the newspapers in Chicago, just after he had been elected president of the National Association of Soil Conservation Districts to succeed the late E. C. McArthur.

"The average citizen does not realize the vital importance to each and every person of the movement which this association represents," said Mr. Leavitt. "Our land—the Nation's land—is ours during our lives but it is on this land that our children will be dependent for the food which will support a civilization for their children. We are attempting through a scientific organized service to build up the present and protect the future productivity of the country's land. We can do it by continuing the present cooperation between farmer district directors, and the Soil Conservation Service and other agencies which bring to each part of our country the scientific facts and technical advice needed to properly care for each acre of our land."

REPORT FROM A BANKER.—The actual dollar enhancement of many of the farms we have observed is just impossible to estimate," writes Robert W. Crouse, farmer and banker of Dry Run, Pa. "At one time our Committee declined a $3,000 mortgage on one of the farms on which you have done extensive work within the past two years because of the limited potentialities due to serious erosion problems. We feel those practices now being employed have definitely curtailed and improved the situation to such an extent that a $4,000 mortgage would be readily approved."

2 Farms Remade Between Dawn and Dusk

IN 12 HOURS last fall, two badly worn hill farms covering 208 acres in Licking County, Ohio, were completely made over on modern, soil-conserving lines. Normally, that job would have taken around 4 years for the owners to accomplish by themselves. Volunteers—600 of them—helped do the job as a dramatic demonstration of the new soil-conservation techniques. An amazed throng of 50,000, gathered on the slopes of a huge natural amphitheater, saw them do it. Everybody, pretty much, agreed that the two farms were worth $10,000 more at 6 p. m. that day than at 6 a. m.

It was on September 21, 1946, that the first 1-day demonstration of this sort was held on the Clyde Milner farm near Pleasantville, Iowa. Since then, approximately 20 such transformations have been effected in Iowa and surrounding Corn Belt States during 1947. But the Ohio show was the most spectacular.

The title for the demonstration, "Opening of the Second Frontier," came from the fact that the only new geographical frontiers left in the United States lie in the better use of the land left available. The historical motif was further emphasized by the fact that this part of Ohio is rich in historical background.

The site of this big agricultural "bee" was the 128-acre farm of John Rodman, 10 miles east of Brownsville, Ohio, and the adjoining 88-acre farm of George Latham. Both young men are veterans. Their properties needed 15 major measures for protection against erosion and for full efficiency. It took a lot of preparation, planning, and action.

The technicians from the Soil Conservation Service helped all the way, from the earliest planning stage until the last act. Everything was under the sponsorship of the Licking County Soil Conservation District. Technical planning was done by Pearl Fogle, of the United States Soil Conservation Service, and members of the local district work unit staff. The district supervisors, headed by J. F. Morrison, chairman, took the lead in planning over-all details. Louis Bromfield, Ohio's noted novelist, known as "The Sage of Malabar

Farm," served as chairman of the general advisory committee.

Central Ohio has never witnessed a cooperative event which has drawn greater public support than 'Opening of the Second Frontier." Strong support and financial help came from farm magazines and newspapers of the Buckeye state, chambers of commerce, civic and farm organizations, the Ohio Division of Conservation and Natural Resources, and from private industry. Heavy power equipment and farm implements to stage the demonstration came from 38 different implement dealers. Limestone companies donated eight carloads of lime, and an equivalent amount of fertilizer was contributed by the fertilizer companies. Several hundred farmers and businessmen of central Ohio gave a day's work to make the project a rousing success. Four hundred ex-soldiers were there. Bands played and local church organizations sold fried chicken and other edibles.

Entry in pioneer pageant.

No soil conservation event has ever received greater recognition from the press and radio. Five major radio stations carried the program, national magazines and farm journals were present, and the wire services gave it national coverage. The "Opening of the Second Frontier" was even carried by the major news reels and shown in theaters throughout the United States. Bill Diehl, staff man for the Newark Advocate, was chairman of the publicity committee.

Fences were torn down and restrung on the contour. Fields were plowed on the contour. Gullies were filled, fields fertilized, pastures limed and fertilized, cover crops seeded, strip crops seeded on the slopes, wet spots tile-drained. A new barn was built. A farm pond was scooped out and quickly started filling from a spring. Wildlife areas were provided. A woodlot was cleaned up, additional trees set out. A great variety of measures, typical of the techniques being applied all over the Nation, to meet the needs and capabilities of our highly varied conditions of land, climate, and type of farming were included, in accordance with the detailed farm plan that had been prepared in advance. The onlookers readily understood exactly what was being done by way of putting every acre, every field, every square foot of land to its proper use in order to protect it from erosion permanently, and to assure increased and continued production according to the capability of the land.

The whole job required 74 tractors, 5 post-hole diggers, 2 tractor-power mowers, 27 plows, 6 disk harrows, 8 grain drills, 54 lime spreaders, 3 buck rakes, 4 field cultivators, 2 disk terracers, 3 cultipackers, 2 hydraulic loaders, 2 dirt scoops, and a lot of small tools.

The project ripened not only from skilled technical direction and district cooperation, but also from the teamwork of the neighbors involved. Rodman and Latham deeded each other portions of their farms to preserve the natural contour lines; an old up-and-downhill boundary fence was ripped up and reset for greater convenience and more perfect conservation. The boundary was fixed at the 1,003-foot contour level—a unique and appropriate provision for avoiding any possible confusion in the future.

State Conservationist Kennard, Louis Bromfield, Hugh Bennett.

Chief Bennett, impressed by the exchange of deeds by landowners, commented in his address: "If we could settle international boundary disputes in the same amicable manner, many of the ills now facing the world would be cured. Moreover, it's going to be difficult to argue about the proper location of the farm boundary, since it is based on a very fixed position—precisely 1,003 feet above mean tide level of the Atlantic Ocean."

The speaker brought the tremendous acreage loss into understandable terms when he remarked that, in all of Ohio, there are just 26,000,000 acres. "The carrying out of 15 major conservation measures here today means the stabilization of these farms for agricultural production," he said. "And because the farms have gained a permanency they didn't have before, their value has been increased decidedly between this morning and this afternoon."

For Hugh H. Bennett the day brought an unexpected recognition which seldom comes to a national leader during his lifetime. In his long career as a public servant Bennett is credited with having done more than any other man to advance the cause of soil conservation. Members of the Ohio Association of Soil Conservation Districts, some time before the field day, had decided quietly among themselves that recognition should be given to the Chief for his outstanding contribution to the Nation's future welfare.

There had been neither advance publicity nor advance notice to the recipient when Clay Stackhouse, as head of the Ohio Association of Soil Conservation Districts presented him with a scroll during the field day ceremonies which reads: "In grateful appreciation of Hugh Hammond Bennett, father of soil conservation, chief of the U. S. Soil Conservation Service—this tablet is placed by the Soil Conservation Districts of Ohio on Second Frontier Day, October 2, 1947." The same inscription has been placed on a bronze tablet which will be permanently mounted on a granite marker along the site of the Second Frontier Field Day.

Commenting editorially upon this unusual recognition, the *Ohio State Journal* in its issue of October 2 said in part: "It is not often that anyone lives to see his works commemorated in a bronze tablet, but there are rare occasions when a man's contemporaries recognize his devotion to a high purpose, his contribution to the welfare of his country and his fellows and his downright hard work, by erecting a plaque or a monument both in his honor and in his presence.

"Everywhere the chief of the Soil Conservation Service has spread the gospel that 'conservation pays' until today there is scarcely anyone in the Nation who does not believe in it to the utmost. His is an achievement which well merits not only a plaque but a place alongside the foremost of the Nation's scientists, inventors, and statesmen, for he can qualify under any and all of those classifications."

AUDUBON HONORS TO BENNETT.—The National Audubon Society, meeting in New York on October 21, awarded a bronze medal to Hugh Hammond Bennett, Chief of the Soil Conservation Service, together with scroll and citation. The citation reads:

"HUGH HAMMOND BENNETT, greatest soil evangelist of all time, true conservationist, whose teaching is now basic in sound agriculture throughout the world, whose achievements supply a chapter in modern school text books of American social history. Consulted by presidents and ministers of state, he never lost the common touch. Philosopher as well as scientist, he had the courage to denounce Americans as a nation of destroyers, careless, greedy, in a hurry, terribly inefficient. Disappearing woodlots were leaving barren hillsides, scarred with erosion gullies. Overgrazing and overplowing were turning mountain pastures and lush prairies into deserts, which blew away in wind storms. With boundless good will, he has shown us how to restore our damaged land, how to prevent further destruction. He gave us hope, a new gospel, and proved that the priceless gift of great natural resources can be both enjoyed and maintained from generation to generation."

TECHNICAL ADVICE REQUIRED.—"Soil conservation has enabled us to stop erosion, grow better crops with less labor, and improve our soils," writes F. W. Atkinson, Augusta, Ga. "Most farmers have the ambition to take care of their soil, and grow crops that are suited to their lands, but without some advice from practical leaders they do not know how to accomplish their aims."

A Banker Appraises Our Duty to Soil

The clock reminds us that time is short for saving the soil.

By WALLACE D. MALONE

Address Before the Alabama Association of Soil Conservation District Supervisors

NEARLY 2,000 YEARS AGO one of the prophets wrote, "Many shepherds have destroyed my vineyard, they have made my pleasant lot a desolate waste. They have made it a desolation. In its desolation it mourns to me. The whole land is made desolate because no man layeth it to heart."

Gentlemen, not so many times in the history of this world has there been born an unselfish idea, with practical and universal application. But when such an idea has been originated in an unselfish mind and heart, it has usually attracted to itself other kindred souls, and has imbued them with a missionary spirit. Many times the birth of such an idea has marked a turning point in the progress of the human race. Sometimes it takes one or more centuries to develop into its full flower, and there is sometimes often a long retrospect before its true value can be assessed.

Let us recall a few instances from history. One such idea was the formation and the publication of the Ten Commandments. I will give you the eleventh later! Another, was the recognition of the universal brotherhood of man. I am my brother's keeper. Another was the recognition and definition of the *natural* rights of every human being (rights which must not be taken away from him, even by the overwhelming majority). The right of free speech, free thought and religious freedom. The trial by a jury of one's peers. Then comes the democratic idea, government based on the will of the people. Government of, by, and for the people.

All of these, together with others which I will not enumerate, have been the stepping stones upon which the human race has traveled away from savagery.

Then, of course, that greatest of them all! The idealist who was born 1,947 years ago—His divine golden rule, everlasting future life, the fatherhood of God. The idea of repentance and forgiveness, and all other Christian attributes. The blessed idea which will some day be universally adopted throughout the world. Then, and not until then, will we have everlasting peace.

And now—perhaps late, but thank God not too late—has come to us the idea of soil conservation on a national scale. Conservation in the interest, not only of ourselves and our fellow men, but even more largely in the interest of future generations. And this idea, like others, has appealed to the missionary spirit of many men.

A few years ago I had charge of the program at the annual convention of the Alabama Bankers Association, and Dr. Bennett addressed the convention. In this address he referred to the fact that he was "born in a North Carolina gully." I said then and I repeat now that this gully should be moved to Washington and framed for all to see. At least it should be made a national shrine.

You see, gentlemen, saving the soil, together with all the byproducts therefrom—the green forests, the little spring in the woodland, the tiny plants, the fish in the streams, the animals and the birds, the very living waters under the ground—saving the soil is absolutely fundamental to the progress, yes, the very existence of the human race. Our work here is basic. The other flowers of civilization will fade if we lose the soil.

For instance, to education we may say. "Your *existence* depends on the soil. Make your analysis of the best methods of training youth to meet life and to be victorious over it. Build your buildings, equip your laboratories, teach our children the *true* history of this world, its languages and customs, and its science. We will make it possible to do these things, *for we will save the soil* so that your voice need not echo in any empty classroom."

To science: "Learn the secrets of all matter and the laws of its behavior. Harness power and matter for the good of man. Have your disputes and arguments over your theories and findings, in an effort to isolate the truth. Make thus a better world. But while you are doing this we will assure the necessities and comforts of life, *for we will save the soil*."

To industry: "Invent and design and operate machines to use the raw materials from the soil, to manufacture those things which have given comfort to man, and have freed him from back-breaking toil and have given him leisure time to enjoy the better things of life. But do not let the machine dominate us. You may do these things because *we will save the soil* and furnish you the materials which go into your end product."

To the sportsman: "Enjoy your well-earned recreation and live a longer and better life therefor. When you pitch your lure in a dark cool spot beneath the overhanging bough remember the stream is clear and fish can live therein only because the soil has been preserved."

To the practical politician who makes government what it really is we say, "We must here

HE SAW A "FINANCIAL GULLY."—Wallace D. Malone is president of the First National Bank of Dothan, Ala., and is a member of the State legislature representing Houston County. (See SOIL CONSERVATION Magazine for September 1947.) He is also, and we might say first and foremost, a soil conservationist. Malone tells how he first became interested in soil conservation, as follows:

"One day a young man came into the bank with a brief case and some other papers. I thought to myself, 'Here comes either a calendar salesman or an income tax man.' He said his name was A. A. Sheppard and he asked for 5 or 10 minutes of my time to talk about soil conservation. I confess it was a subject I knew little about, except that improperly constructed terraces would break.

"Sheppard came to me with a zeal and spirit I have seldom seen. He gave me a shock when he made the statement that practically every farm in this county had lost a good part of the topsoil. I disputed this statement and picked out one of the finest level farms in this section to disprove his argument. After he had proved to my satisfaction that this farm itself had lost around 25 percent of its topsoil and that a lot of land was being cultivated that had lost as much as 50 percent, I began to wake up.

"What really shocked me was his statement that soil building crops *will not* completely restore soil to its natural condition and volume. You see the finality there. I then realized that we must make vigorous efforts to save the soil that we have left ahead of everything else.

"I remember some of the early settlers came into this county because, they said, their soil 'wore out' over in Georgia. I began to realize that the soil did not wear out, but they permitted it to wash into the Chattahoochee River. I then realized that soil erosion would wash a financial gully right under my bank if we permitted it to continue in this area.

"I took an airplane trip over this county and saw the jagged gullies, whose snake-like figures ran out in every direction. I also saw the sheet erosion from the air. I flew over my own farm and was painfully surprised to see that I did not know how badly my own farm was eroded. Then, as a final upset, Sheppard showed me how erosion was not only destroying the soil on the hillside, but that it also, when it got to a certain degree, destroyed the soil in the valley by putting the clay on top."

A. A. Sheppard, referred to here, is district conservationist of the Soil Conservation Service at Tuskegee, Ala. At the time of his first talk with Banker Malone he was superintendent of a CCC camp assigned to the Soil Conservation Service near Dothan.

make democracy work. We must not continue to abuse it through selfish interest, political or otherwise. If we do, it will fail and its place will be taken over by strange theories which know not God. And right here let me say, let no man lay political hands upon this vigorous and zealous and noble endeavor, gentlemen, it is operating as smoothly as a watch. By all means let us leave it alone—this organization of missionaries who spread a vital message of hope through the land and by their enthusiasm are stopping the ravages of erosion. You make democracy work and meanwhile we will preserve that which it must have to survive—the soil."

What shall we say to the makers of war? "Though war destroy the cities, take the lives and health and security of millions, even though it cut down the young pear trees and apple trees and vines, God will wipe away all tears, and *if the soil be not lost too*, another and brighter and fairer civilization will grow on that spot. The cities will be rebuilt and the fields will be replanted—for we will save the soil."

The soil gives strength. Any nation that either got very far away from the soil or permitted its soil to leave, did not survive. The soil gives strength to the individual. I remember in 1932 when I was in the banking business—and many a time then I wished I was back in France fighting the Germans—I remember when worry put my nerves on edge. When I couldn't soundly sleep. I remember my doctor told me to play golf, to have a hobby, to go to the picture show, or to play chess, to distract my mind. I tried these with fair results. But when I really wanted peace of mind and a renewal of my strength and courage, nothing brought this like lying flat on the good earth, getting as close to it as I could. At such times I recall the giant, Antaeous, whom Hercules had to fight. Every time Hercules would throw him to the ground, Antaeous' strength would be revived 10 times. Hercules won only by keeping him in the air and keeping him away from the earth until his strength was gone.

If we lose the soil we lose all, so let us take this for our creed, and I quote the eleventh commandment. "Thou shalt inherit the holy earth as a faithful steward, conserving its resources and productivity from generation to generation. Thou shalt safeguard thy fields from soil erosion, thy living waters from drying up, thy forests from desolation, and protect thy hills from overgrazing by thy herds, that thy descendants may have abundance forever. If any shall fail in this stewardship of the land, thy fruitful fields shall become sterile, stony ground and wasting gullies, and thy descendants shall decrease and live in poverty or perish from off the face of the earth."

So let us go about our work conscious that when there shall have been allotted to each of us, the 21 square feet of this earth's surface, we shall have deserved it, if during life we have saved from destruction that many square feet, or more, for the future benefit of the human race.

The good earth—nature spent *millions* of years to make it. Let us not lose it in a moment! Therefore, let us lay it to our hearts.

GUIDES SPEED CONSERVATION IN NORTHEAST

By O. C. BRUCE

WHEN INCREASED DEMAND for technical services stepped up our work load by leaps and bounds, as organization of districts swung into high gear, it became clear that we needed a ready-reference guide for both new and experienced technicians if the high standards of the Soil Conservation Service were to be maintained.

We needed a document, prepared locally, that would be of material help to technicians in making sound recommendations for land use and conservation treatment. It was needed for experienced employees who were transferred from one work group to another as districts developed rapidly. It was needed for in-Service training for new employees. Most important, the document had to be developed by field workers themselves, so they would understand it and use it to speed the production of farm plans.

Accordingly, a general outline was devised by a regional field committee which spent months of

NOTE.—The author is regional chief of operations, Soil Conservation Service, Upper Darby, Pa.

Tolland, New London & Windham Counties, Conn. - SCSol.4.6

SOIL GROUP 3

SOILS

63c5 Enfield fine sandy loam
63cW Enfield very fine sandy loam
63b Enfield fine sandy loam (shallow phase)

DESCRIPTION

Wind deposited material of fine mellow texture sandy loam as a mantle of two to four feet deep over gravelly till or sandy outwash. The surface textures of these soils are either fine sandy loam or very fine sandy loam. Subject to wind erosion & severe sheet & rilly water erosion when occuring on rolling slopes. There are no stones or gravel present under natural conditions. The productivity of a wide variety of crops grown on these soils is well above average. Shallow rooted grasses in pasture are less productive when established on these soils.

LUC TABLE

Slope	Erosion					
	1	2	2T	3	3T	3R
A	I	II	II			
B	II	III	III	III	IV	VII
C	III	III	III	IV	IV	VII
D	IV	IV	IV	VI	VI	VII
E	VII	VII	VII	VII	VII	VII
F	VII	VII	VII	VII	VII	VII

CONSERVATION PRACTICES AND TREATMENT ACCORDING TO CAPABILITY CLASS AND LAND USE

LUC CLASS	LAND USE	SEED, TREE, AND SHRUB, MIXTURES (37)	TREATMENT: Fertilizer	Manure	Lime to pH	SUPPORTING PRACTICES
I	5 years continuous row crops w/cover - 2 years soil bldg. legumes & grasses or green manure	Rye 1.5 to 2.5 bu. per acre or Winter Wheat 1.5 to 2.5 bu. per acre or Ryegrass 20# per acre Sweet Clover 15-25# per acre Soil Building:- 6# Red Clover, 1# Ladino Clover, 6# Timothy, 1# Red Top OR Green Manure:- Soybeans 6-8 pks. OR Millet 25#, Soybeans 4 pks.	400# 7-7-7 on cover or Soil Building Mixture:- 500# superphosphate 200# muriate of potash or Green Manure:- Inoculation 500# 4-12-4	15 T 12 T	5.2	Windbreaks (5), Cover crops (1), Crop Residue Mgt., Obstruction Removal, Irrigation (40), Mulch, Headland seeding, Contour planting (2), Spot Drainage (40), Sod Waterways (3)
	Peach Orchards	Rye 1.5 to 2.5 bu. per acre Winter Wheat 1.5 to 2.5 bu. per acre Ryegrass 1.5 to 2.5 bu. per acre Sweet Clover 15-25# per acre	400# 7-7-7 on cover or	15 T	5.5 (34)	Good fertilization, Spot drainage (40), Water supply development, Cover Crops (1), Mulch, Contour Planting (40), Headland seeding
II	"A" Slope 4 years row crops w/cover 2 year green manure OR Soil Bldg. grasses & legumes	Rye 1.5 to 2.5 bu. per acre Winter Wheat 1.5 to 2.5 bu. per acre Ryegrass 20# per acre Sweet Clover 15-25# per acre Green Manure:- Soybeans 6-8 pks. OR Millet 25# & Soybeans 4 pks.	400# 7-7-7 on cover or Inoculation	15 T	5.2	Strip Crop (4), Diversions (40) & Outlets (17), Green manure, Mulch
	"B" Slope 4 years row crops w/cover 2 years green manure OR Soil bldg. grasses & legumes	Soil Building:- 6# Red Clover, 1# Ladino Clover, 6# Timothy, 1# Red Top	500# 4-12-4 500# superphosphate 200# muriate of potash	12 T		Terraces & Outlets (40), Green Manure, Cover Crops (1), Diversions (40) & Outlets (17), Clearing & Obstruction Removal, Crop Residue Management, Headland Seeding, Green Manure
	"B" Slope 2 years row crop w/cover 2 years hay	Rye 1.5 to 2.5 bu. per acre or Winter Wheat 1.5 to 2.5 bu. per acre or Ryegrass 20# per acre Grass Seed Mixture:- 6# Alfalfa, 6# Timothy or 8# Orchard Grass, 1# Red Top, 4# Red Clover	400# 7-7-7 on cover or 500# superphosphate 200# muriate of potash or	15 T 15 T	5.2	Contour Strip Cropping (4), Cover Crops (1), Diversions (40) & Outlets (17), Mulch, Crop Residue Management, Clearing & Obstruction Removal, Headland Seeding, Spot drainage (40), Sod Waterways (3)
	Peach Orchards	Rye 1.5 to 2.5 bu. per acre or Barley 1.5 to 2.5 bu. per acre or Ryegrass 20# per acre Sweet Clover 15-25# per acre	400# 7-7-7 on cover or	15 T	5.5 (34)	Orchard Terraces (40), Layout on Terrace grades (40), Alternate sod strips, Cover crops (33), Water supply development
III	2 years Row Crop w/cover 4 years hay	Rye 1.5 to 2.5 bu. per acre Winter Wheat 1.5 to 2.5 bu. per acre Ryegrass 1.5 to 2.5 bu. per acre Sweet Clover 15-25# per acre Grass Seed Mixture:- 10# Alfalfa; 6# Timothy or 8# Orchard or 8# Field Brome; 2# Red Top OR 6# Alfalfa; 6# Timothy or 8# Orchard Grass; 4# Red Clover, 1# Red Top	400# 7-7-7 on cover or Initial Hay Treatment:- 500# superphosphate 200# muriate of potash Annual Top Dress:- 200# superphosphate 200# muriate of potash	15 T 15 T	5.2 5.5	Narrow contour strip cropping Diversions (40) & Outlets (17) Mulch Cover Crops (1)
	Apple Orchard Pear Orchard	Grass Seed Mixture:- 6# Alfalfa, 6# Timothy, 4# Red Clover, 1# Red Top	Initial Treatment:- 500# superphosphate 200# muriate of potash or 20# Borax on alfalfa Annual Top Dress:- 200# superphosphate 150# muriate of potash	15 T	5.5 (34)	Permanent Sod Cover, Water Supply Development, Mulch, Contour Planting (40), Spot drainage
IV	Long Term Hay	Grass Seed Mixtures:- 10# Alfalfa; 6# Timothy or 8# Field Brome; 1r Red Top OR 8# Alfalfa, 4# Red Clover, 6# Timothy, 1# Red Top	Initial Treatment:- 500# superphosphate 200# muriate of potash or 20# Borax on Alfalfa Annual Top Dress:- 200# superphosphate 150# muriate of potash	15 T	6.3	Control grazing, Rotation grazing (38), Mow during early bloom stage (36), Re-seed in strips, Stock Water Development (7)
	Hedge Rows (6)	Multiflora Rose (19) Armor Privet	4 oz. 5-8-7 per seedling		5.0	Site Preparation, Pruning, Release Cutting, Wildlife management
	Windbreaks (5)	Trees:- White Pine, White Cedar, Norway Spruce, Scotch Pine Shrubs:- Low - Bayberry (18), Filbert-Hazelnut (18), Multiflora Rose (19) High - Silky Cornel (23), Tatarian Honeysuckle	4 oz. 5-8-7 per shrub seedling		5.0	Site Preparation, Pruning, Release Cutting, Wildlife Management

study and careful planning. To date, about 75 technical guides, covering approximately half the land in the northeastern States, have been completed. More are in preparation. Ultimately, there will be a technical guide for each work group in the 12 States. Where a work group has two or more work units with widely different conditions of soil and agriculture, a guide may be prepared for each such unit.

Each technical guide is developed in the field with the assistance of zone conservationists, technical division chiefs, county agents, farmers, members of district governing bodies, extension specialists, experiment station workers, and others. The job is done in "off seasons" or so-called office days when field work can't be carried on. The result is a simplified agricultural workbook for the area. The soils are grouped according to the physical features which affect moisture conditions, crop adaptations, natural fertility, and the type of practices favored. One page is devoted to each soil group. This contains a description of the soil group and a table showing cropping systems and conservation practices considered appropriate for each capability class.

In addition to the grouping of soils (many guides have 20 or more) and the conservation recommendations, there are sections which explain the meanings of various soil characteristics, slope categories, and land-use classes. Offhand, this

might appear to be a bulky, cumbersome document. Actually, because of the excellent work of the committee, the technical guides are simple, concise, and easy to follow.

The outline prepared by the technical guide committee calls for nine parts, the last section being the appendix where reference material, bulletins, tables, and other items may be included. Part VII is the "keystone" of the guide. It is the set of charts, organized by soil groups, wherein the physical conditions are correlated with land use and the needed conservation practices recommended. A study of the accompanying chart, which is reproduced in part, will reveal the detailed information included in the "keystone" section of each technical guide.

With the conservation survey map before him, all a farm planner has to do to plan a field is to note the type of soil and determine its soil group, the slope, and the degree of erosion. By referring to the land use capability table, included on the soil-group sheet, he can tell at a glance the land use capability class in which it falls.

He can then glance down the left margin of the page and find the corresponding land use capability class. If he is dealing with class II land, he will find a number of recommended uses for this group of soils which are in class II. He then selects the recommendation which he believes will best meet the farmer's needs; and then, on the same line of the chart, he will find recommended seeding. Next to that will come instructions for fertilizer, lime, and manure. In the right margin, he will find recommendations for supporting conservation practices. Complete instructions are provided for all classes of land, from safe cropland requiring no conservation practices to class VII land which should be planted to trees or shrubs.

So much for preparation and use of the technical guide. We are now taking the second step: Coordination among neighboring districts which have similar soil types and conservation problems. In this activity, the zone conservationists are taking the leadership.

As an example, Zone Conservationists Charles H. Lloyd and Gail W. Eley last winter held conference with numerous district conservationists to gain a uniform approach to common problems. Technicians have benefited by the shared experiences of all those present, and technical guides were improved.

Efforts of zone conservationists have not stopped at State boundaries. In one instance, meetings were held with technicians of the York and Lancaster County Soil Conservation Districts of Pennsylvania, and those from the Baltimore and Harford County districts of Maryland. Extension agronomists of the University of Maryland met with them. In this instance, major emphasis was placed on Piedmont soils, which are found in all four work groups. Uniformity, of course, isn't sufficient justification in itself, but a meeting of minds among persons with a wide variety of experiences with particular types and conditions of soil just naturally results in an improved approach to the management of such soils.

This pioneer work in correlating technical guides isn't limited to interstate collaboration but opens up possibilities for interregional cooperation. Certainly, States which have a common border, but are in adjoining regions, have mutual problems whose solution can be speeded up through interregional conferences.

It's too soon to estimate just how much the use of technical guides has helped the Northeastern Region to double its annual production, but it's certain that by cutting planting time to a minimum, their contribution has been considerable.

TERRACES STOP EROSION.—"My crop yield this last year was slightly better than 10 percent over the preceding year," writes S. D. Ellison, Winnsboro, S. C.

"This farm contains approximately 1,200 acres of land—approximately 650 acres under cultivation, 400 acres in woodland, and 150 acres of cleared land not in cultivation. Under the supervision of the county conservationist, I have constructed more than 85,000 linear feet of terraces, thereby completely stopping erosion on a large acreage of the cultivated land. The good these terraces have done shows not only in improved crops, but in the better appearance of the land, thereby enhancing the value of the farm. With the continued help of the Soil Conservation Service I plan now to terrace every acre on the farm and will be able to cultivate this coming year about 30 acres that have been practically thrown out.

"Following the advice of the Soil Conservation Service I have seeded about 150 acres of land in sericea lespedeza and put out 10 acre of kudzu and am allowing about 25 acres to grow up in loblolly pine. The stand of pine is exceptionally good as it is constantly being reseeded from seed trees on three sides of this field.

"The good derived from strip-farming on a 25-acre field speaks for itself—I did not have a break in any terrace on this field.

"Lespedeza was seeded in all fields where grain was planted and I will repeat this practice this year with the exception of a 35-acre field that I expect to follow with giant striata crotolaria."

MANY HANDS BUILD Granite Creek DIVERSION DAM

By CHARLES F. RORK

ONE OF THE BEST EXAMPLES of cooperation by Federal and local agencies in attacking a soil-and-water-conservation problem is the Granite Creek diversion dam in central Arizona.

A few miles north of Prescott lies the 5,776-acre Chino Valley Soil Conservation District. As in all western States, the conservation and wise use of water on irrigated lands is a major problem. District operations in Arizona are by law confined to farm lands and are not authorized on range and forest areas.

Shortly after the district was set up and the board of supervisors was organized, late in 1945, Chairman Carl Clark and Supervisors De Vere Pace and Jenner Hatch met with John D. Freeman, district conservationist, to begin work on the district program and work plan, and to size up their conservation problems.

The district's main farming enterprise is the Chino Valley Irrigation Co. This organization supplies life-giving irrigation water to 55 farming units comprising about 2,600 acres, and the stockholders depend upon the water supply of Granite Creek to mature their crops.

When the district was formed, many of the irrigated farms usually suffered from an acute water shortage in midseason, when crops need water most. The total streamflow from melting snow in the watershed was sufficient for the acreage under cultivation. However, much of this snow melts early in the spring and tends to run off before irrigation water needs are greatest. Because of this unbalanced water supply, farmers often applied too much water in the spring. The result was to impair soil structure and cause soil depletion by leaching of plant foods.

The water of Granite Creek was being diverted into the canal system by means of an old patched-up dam of wood, rock and wire, with a concrete base resting on the gravel stream bottom. Twenty-five feet of gravel separated the dam from bedrock and underflow was responsible for most of the loss of 1,500 gallons of water per minute throughout the irrigation season. Annual maintenance costs for the last 20 years had been exceptionally high.

Improvements in irrigation practices were needed on all farms in the district. Many of the farm irrigation systems needed major changes such as land leveling, reorganization of fields, improved canal structures, and canal lining. These measures would conserve water and labor, increase production, and prevent soil decline.

"Before we can make any of these changes, though, we must find a way to strike a better balance between water supply and crop needs," Chairman Carl Clark said to his associates. "The first job we ought to undertake is to build a better diversion dam in Granite Creek so we won't waste so much of our valuable water."

Clark also was a member of the water board of the Chino Valley Irrigation Co. Year after year, he had helped with the futile maintenance on the old dam and had noticed the precious water going to waste at this point.

The water board members agreed with the soil conservation district supervisors that the problem

NOTE.—The author is zone conservationist, Soil Conservation Service, Phoenix, Ariz.

should be studied and action planned. They realized that the value of the water lost and the cost of maintaining the old structure throughout the years would have paid for an efficient and substantial dam many times over.

On October 15, 1945, the district supervisors requested the Soil Conservation Service to investigate the proposal for a new dam. They wanted to know what would be the best type, how much it would cost, and how long it would take to build.

Freeman called in W. G. Glover, the work group engineer. They decided to study the proposal immediately, and invoked the assistance of the zone conservationists and regional engineering staff.

Glover made a detailed engineering survey of the proposed site. He drew up an accurate topographic map, and made 200 foundation soundings to determine depth and shape of bedrock. Plans, specifications, and cost estimates were prepared. These indicated that a concrete gravity-type dam was most adaptable. It should be 120 feet long with a maximum height of 25 feet above bedrock. The crest width should be 30 inches and the base width 16 feet. This would take 590 cubic yards of concrete and cost approximately $11,000. Three contraction joints with copper seals would be required to prevent cracking.

Carl Clark, chairman of the board of supervisors of the Chino Valley Soil Conservation District and member of the Chino Valley water board.

The plans, specifications, cost estimates, and contract conditions were turned over to the water board 1 month after the request was received. The board decided to ask bids from contractors.

The bids were based on unit costs and the lowest was about $20,000. This was approximately $8,000 more than the irrigation company could afford.

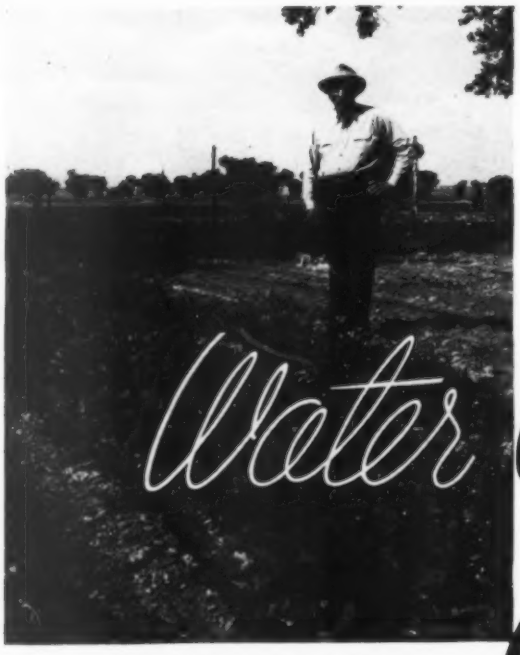
Most of the water board was about ready to abandon the project. They felt that they couldn't finance such a big job. But Clark believed that the dam could be built for close to $11,000, as the Soil Conservation Service technicians had figured. He checked again with the engineers and asked what personnel and equipment would be needed to build the dam within the original estimate.

He was told that he would need an experienced and dependable superintendent and foreman, a ⅜-cubic-yard dragline, a 40-horsepower tractor equipped with bulldozer, four pumps, a concrete mixer, trucks, and a crew of at least 12 laborers, in addition to the necessary materials. He found that the local agricultural conservation committee, under a pooling agreement, would commit a $5,000 payment if the dam were built according to Soil Conservation Service specifications.

Clark immediately contacted the water board members, and, with this information, they decided to start construction right away. The board made Clark superintendent of the job and gave him full authority to act and deal on behalf of the company. He found a well-known concrete man, Carl Davis, to serve as foreman. Farmers holding stock in the company agreed to devote their own labor when asked to do so.

The soil conservation district supervisors promised to rent the company a dragline of the proper size. This had been loaned to the district by the Soil Conservation Service for work of this sort. The district charged a rental sufficient to cover normal operation, maintenance, and replacement costs.

(Continued on page 144)



Al Foutz in the garden that produced the first early peas in the San Juan Valley last spring.

Water Problems in the Southwest

By ELIZABETH J. POE

WHAT CAN A FARMER do when his land is waterlogged? Dig a drain? Blast a drain? Find out where the water is coming from and try to stop it? There are many answers to this problem, which occurs in certain areas of the Southwest more often than most people realize.

Railroad dikes, undiscovered clay substrata, bad irrigation methods—all these unrelated causes have been found by the Soil Conservation Service to be at the bottom of various waterlogging problems in New Mexico, Utah, and Colorado. In one instance investigated by a soils scientist, nobody in the neighborhood of the swamped field could remember when it had last produced a crop. In another, a farmer had spent a considerable sum building three ditches to drain an unproductive field and had got nothing for it. He was reluctant to pour money down the drain. Like many other landowners in the Southwest region who have worked with soil conservation districts on drainage problems, he found that his drains wouldn't work until he knew what was under his field—six feet down.

This landowner was Al Foutz, who has become one of the leading advocates in the San Juan Basin of northwestern New Mexico of progressive measures that control seep and maintain productivity.

About 3 years ago Foutz sought out A. P. Blake, chairman of the San Juan Soil Conservation District board of supervisors. For many years Foutz had been troubled with waterlogging, and the dis-

Here is where water gushed out at head of drain.

NOTE.—The author is information specialist, Soil Conservation Service, Albuquerque, N. Mex.

Sheep grazing on once seeped and useless alfalfa pasture. The land beyond them, also waterlogged before drainage, is plowed and ready for a crop.

trict supervisor suggested that a Soil Conservation Service farm planner come out to the Foutz ranch and look the situation over. But Foutz himself tells the story from this point, which starts after the farm planner had come to see him.

"When we got through tramping around the farm talking about the different points of development you could just see a blueprint of the future of my place, and it looked pretty good. That young fellow said he'd have a soils man and an engineer from the Soil Conservation Service up the next Tuesday morning to make a survey for the drain. Sure enough, bright and early that morning I saw them out there setting stakes and drilling holes all over that seep land and out in the cropland, too. They set stakes every 100 feet. Then, with an inch auger bit they drilled holes 6 feet deep at each one of those stakes, testing the soil every foot of the way down. When they got through I had as good a picture of the different types of soil under the surface as I had of that on top.

"They said I had a clay dike holding up the water that would ordinarily move along under the ground without causing any harm. This ponded underground water caused an accumulation of alkali salts at the surface as well as waterlogging the land and it would just keep spreading, which certainly was the case, since the school had reported it was starting to come up in the basement, over a half mile away.

"They figured it would cost me about $200 to dig a drain to take care of the situation. I didn't like the idea as I had already dug three drains just like the one they wanted, but I could see from that underground picture they had made why my drains never worked.

"Well, I finally gave them the go-ahead and the soil conservation district dragline moved in. I felt pretty good until the day my $200 budgeted for the job ran out. I'd spent the required amount on this drain and the water wasn't running in it any more than it was in the others. That young soils man wouldn't listen, though. He had his soils map there and showed me that in just 50 feet more we'd cut the clay dike. He said that $200 was only an estimate and since the engineers were trying to give me the figure as near as they could guess it, I ought to allow some margin.

"Well, that young fellow missed his mark by 3 feet. At 47½ feet that dragline pulled out a chunk of dirt and it looked like a dam had broken. The water poured through the bank like a small river and has been running steadily ever since. You'd think they had broken through a cement wall instead of that innocent looking red streak about 6 inches thick that slanted up from where the water broke through.

"My swamp pasture dried up after this drain was dug and the basement rooms in the schoolhouse are dry, too. The crops sure looked better on the adjoining fields and with some leaching and use of corrective measures, it will soon be the best land on my place. This year I've plowed up the swamp grass and am farming that land, too."

Foutz solved his seepage problem with a soils survey—the first job a soil conservation district does before it tells a farmer how to plan his land for the highest production.

In another case, also in New Mexico, it took a rearranged irrigation system to bring 10 acres of seeped land back into production. This field belongs to A. F. Apodaca, who lives near Bernalillo, north of Albuquerque. Mr. Apodaca has a 60-acre farm which once included a wet alkali area of 10 to 15 acres. Nobody could remember when that wet area had produced a crop. A railroad dike on the west side of the field and the lack of drainage ditches had made it impossible to drain the place economically. Waste irrigation water from the rest of the field had been allowed to accumulate on this tract since the railroad dike was built.

The soils technician, called from Santa Fe to look over this problem, immediately saw that the

field had never been irrigated properly. The first job was to level the upper 50 acres. Soil-saving dikes were built and new lateral ditches, gates, turn-outs and drops were installed. The 10 acres were smooth-leveled, bordered, and planted to irrigated pasture. During the past growing season, nearly all the area produced a good crop of irrigated pasture.

This was the most practical and economical approach to the wet alkali problem when only one farmer was involved, but in another area of the Southwest, near St. George, Utah, a soil conservation district has mapped out a plan for draining 1,700 acres of land waterlogged because of poor drainage, overuse of irrigation water, and misuse of waste waters. An attempt to form a drainage district among the landowners involved there failed, but five or six farmers who stood to benefit the most have gone ahead with district recommendations. Working together, these farmers have built drains that will affect about 200 acres of land. Already from 20 to 30 acres that have been drained are in pasture crops. Immediate lowering of the water table in this area brought enthusiasm from the farmers who first objected, and it is believed that eventually the plan to drain the whole area can be carried out as the district planned.

One hundred twenty acres of land owned by Alex Miller of Las Animas, Colo., have been drained under Bent County Soil Conservation District recommendations. This area once grew nothing but salt grass, swamp grass, and tules, but last year 40 acres of the reclaimed land were cropped to yellow sweet clover and furnished sheep pasture. The rest of the land would have been cropped had labor been available. Miller also took 89 sacks (11,347 pounds) of clover seed from this field the fall of 1946. Next year he plans a different crop for his new farm land.

These farmers have found that the advice of a trained soils technician made available by the Soil Conservation Service through soil conservation districts has almost always solved problems that stumped them. The variety of causes—the variety of answers—indicates that it pays to know all before a drainage operation is started.

GRANITE CREEK (*Continued from page 141*)

The Yavapai County Highway Department leased to the irrigation company a tractor with bulldozer, compressor, two pumps, a dump truck, and a cement mixer. One of the company stockholders, R. L. Walde, who irrigates 10 acres in Chino Valley, contributed concrete drain tile. The Prescott High School made available two more pumps, needed to dewater the foundation. Other necessary equipment was loaned by city officials and the State highway department.

Part of the foundation excavation was 25 feet below the stream bottom. The foundation had to be dewatered and part of the concrete was deposited under water. In spite of winter weather, rain, and numerous other construction difficulties, no accidents occurred and the job was completed ahead of schedule, and the dam was ready for use on February 25, 1946.

Actual cost ran to about $11,300, which amounted to only $19 per cubic yard of concrete. The company estimated the value of the engineering service provided through the district by the Soil Conservation Service at $1,500. These services included preliminary investigations and surveys, detailed design studies, final plans and specifications, construction schedule, and technical supervision of construction. Actual cost to the Government for these services was only $750, or about 6 percent of the total job cost.

Herb Rees, water dispatcher for the Chino Valley Irrigation District, says: "With only about half a head of water turned in at the dam, we are getting as much water as ever down in Chino Valley. We owe this to the saving of water we are getting from the new Granite Creek diversion, for it is saving more water than I ever dared hope."

Yavapai County Agent John McLernon, who is an ardent booster for soil conservation says: "The construction of the Granite Creek diversion dam is the best example of cooperative community work I have ever seen. I attribute this partly to the efforts of Carl Clark, chairman of the Chino Valley Soil Conservation District board, and partly to the designs and specifications as drawn up by engineers of the United States Soil Conservation Service. This job shows excellent cooperation between the various agencies involved."

The district is now working hard on individual farm conservation plans to prevent water losses on farm lands and to save the soil. The Granite Creek dam was only the "opening gun" of an all-out conservation program in this district.

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